University of Anbar
College of Engineering
Dept. of Electrical Engineering

Fundumantal of Electronic II

Second Class

Chapter05: BJT AC Analysis

Lec05_p3

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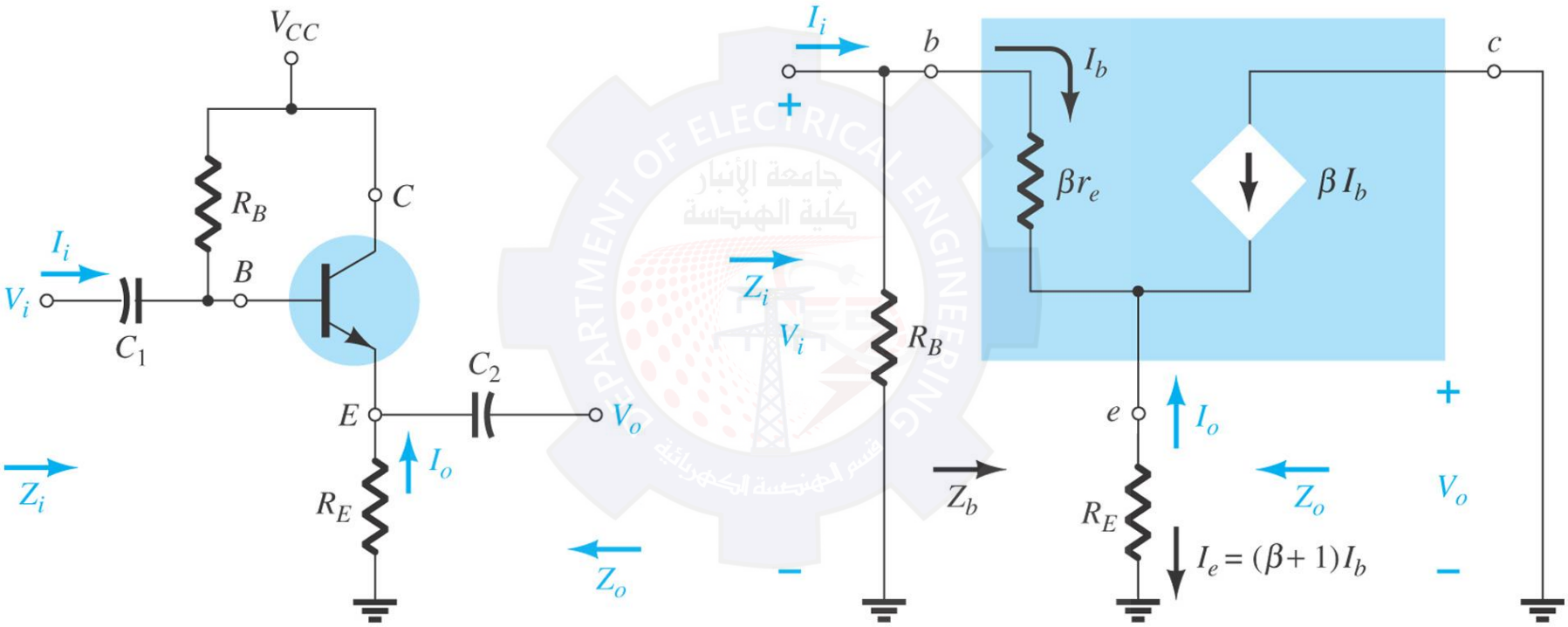
Emitter-Follower Configuration



- This is also known as the common-collector configuration.
- The input is applied to the base and the output is taken from the emitter.
- There is no phase shift between input and output.

Impedance Calculations

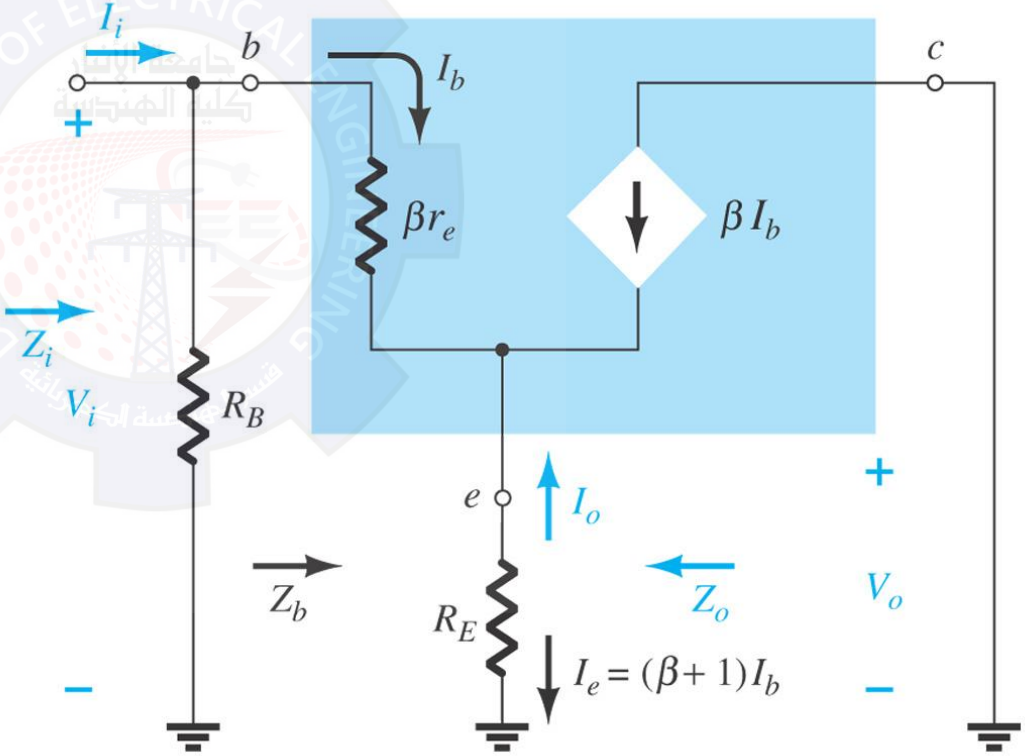
Input impedance:

$$Z_i = R_B \| Z_b$$

$$Z_b = \beta r_e + (\quad +1) R_E$$

$$Z_b \cong \beta (r_e \quad R_E)$$

$$Z_b \cong \beta R_E \quad (\text{for } R_E >> r_e)$$



Impedance Calculations

Output impedance:

$$I_b = \frac{V_i}{Z_b}\ , \mathrm{I_e} = (\beta+1)\mathrm{I_b}$$

$$= (\beta+1)\frac{V_i}{Z_b}$$

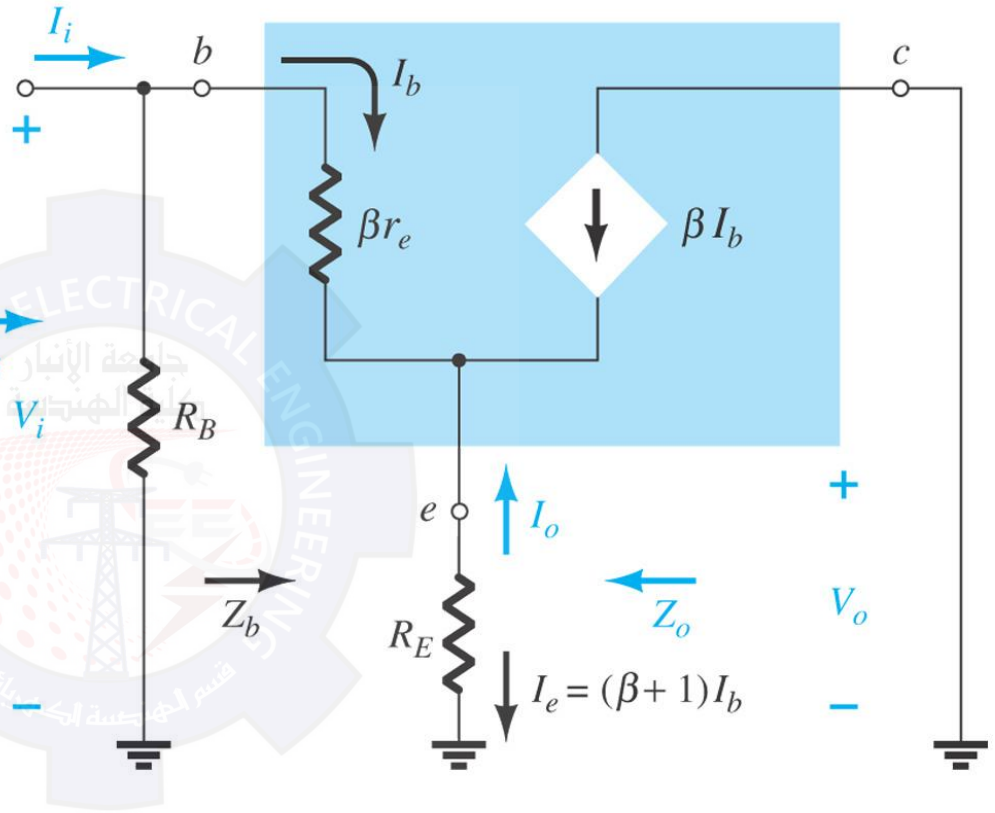
$$I_e = \frac{(\beta+1)V_i}{\beta r_e + (\beta+1)R_E}$$

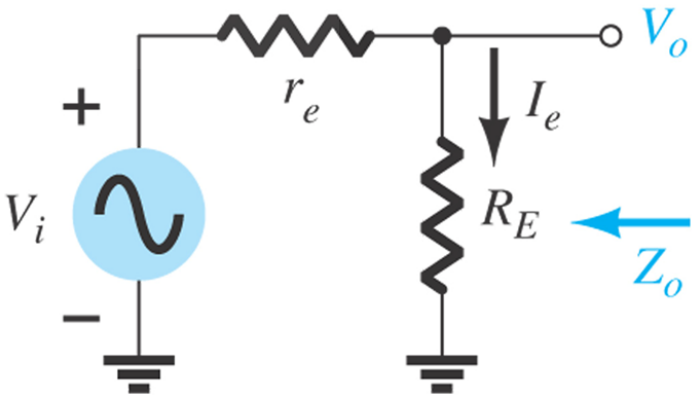
$$since\ (\beta+1) \cong \beta$$

$$I_e = \frac{V_i}{r_e + R}$$

To determine Z_o, V_i is set to zero

$$Z_o = R_E \| r_e \ , \quad Z_o \quad r_e \Big|_{R_E >> r_e}$$





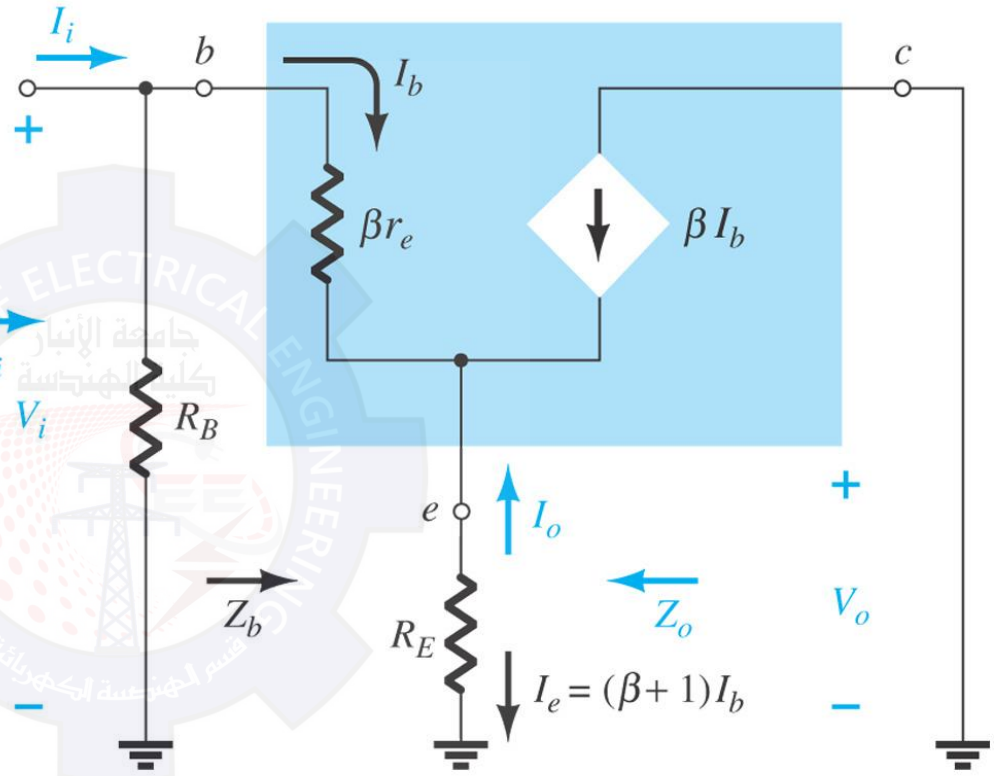
Gain Calculations

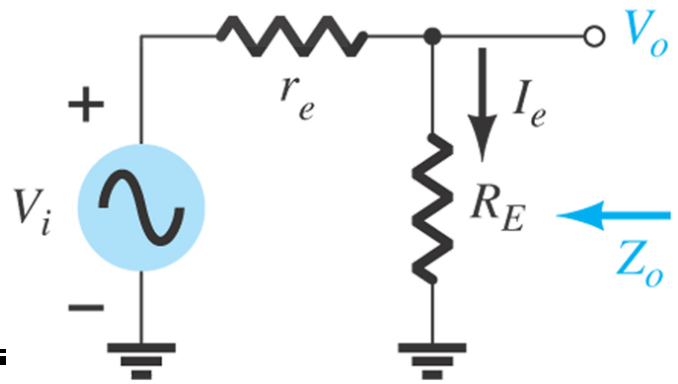
Voltage gain:

$$V_o = \frac{R_E}{R_E + r_e} V_i$$

$$A_v = \frac{V_o}{V_i} = \frac{R_E}{R_E + r_e}$$

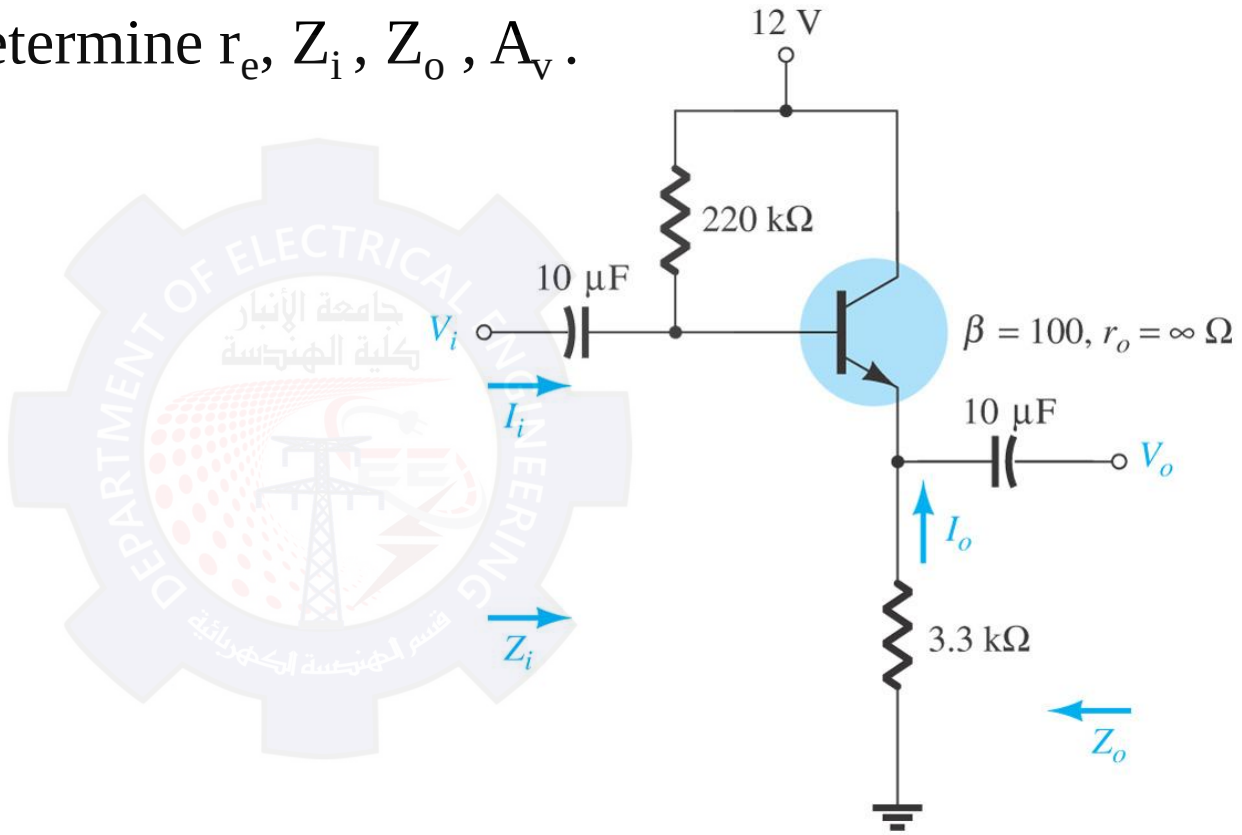
$$A_v \quad \frac{V_o}{V_i} \cong 1 \Big| \quad R_E >> r_e,\ R_E + r_e \cong R_E$$





Example 5.7

Determine r_e, Z_i , Z_o , A_v .



Example 5.7 - solution